

eInfoC MOBILE PAYMENT MODEL AND WAP SITE PROTOTYPE FOR SALES OF eBooks

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ABSTRACT

In this paper, we describe the process flow model in implementing mobile payment (mPayment) as the payment method for buying eBook. The model serves as a diagrammatic representation of the processes that are involved. In addition, the WAP site features to browse eBook are also identified and produced to enable eBook Providers to market their products via mobile phones. Our study is based on and centred around an Electronic Information Centre (eInfoC) proposed and developed by researchers at Universiti Utara Malaysia.

Keywords

Mobile Payment, eBook

1. INTRODUCTION

Electronic Information Centre (eInfoC) is a pioneer project for publishing, promoting and marketing of eBook in Malaysia. The project was initiated by several lecturers from the Universiti Utara Malaysia (UUM). To date, eInfoC web site (www.e-infoc.uum.edu.my) has successfully promoted and marketed publications especially from the UUM academicians.

The current payment practices in eInfoC are “forwarded by lecturer”, credit cards, cash and cheque. However, due to customer demands for payment system that are accessible by the mass of students, ease of use and convenient, and requires no major investment in the infrastructure and technologies, mobile payment (mPayment) might be one of the solutions [1].

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mPayment can be defined as the use of mobile devices such as mobile phone, PDA (Personal Digital Assistance), tablet PC or mobile computer to make payment for purchasing goods and services. mPayment can be performed through any of the existing wireless network whether Wireless LAN (IEEE 802.11 protocol), Bluetooth, Infrared (IrDa) or cellular networks such as GSM, GPRS or 3G ([2],[3],[4]).

Mobile phone plays a major role in people's life today. Its function has been extended from voice communication only devices to Internet surfing and data transfer. People have developed attachment to the mobile phone and keep it as a companion for everyday life [5]. Also, with the millions of mobile phones sold to the users combined with the available technologies such as WAP (Wireless Application Protocol) and SMS (Short Message Service), and driven by the high demand for mobile contents will certainly make mPayment using mobile phone a very promising business.

mPayment is popular among users for purchasing ring tones, games and music [6], however the use of mPayment for buying eBook is not yet available [1]. The use of mPayment method for buying eBook is seen as the most suitable method since majority of the higher learning institutions' students own mobile phones. This is confirmed by a survey conducted in UUM [7].

Therefore to start implementing mPayment as the payment method for buying eBook, a process flow model has to be proposed and developed, where the model serves as a diagrammatic representation of the processes that are involved. Section 2 details the process flow. In addition, the WAP site features to browse eBook should also be identified and produced to enable eBook Providers to market their products via mobile phones. This is discussed in section 3.

2. mPAYMENT PROCESS FLOW FOR BUYING eBooks

Here, we propose a comprehensive process flow for mobile payment system for buying eBook. Before we discuss the flow, which is in Process Flow Diagram (PFD), an overview of the used of Premium SMS (P-SMS) as the payment scheme for buying eBook and Receipt System as the method for collecting purchased eBook are discussed.

2.1 Premium SMS (P-SMS)

P-SMS is a profit sharing based system; Telco and eBook Provider will share the profit from the transaction on the agreed ratio per successful SMS replied back to the buyer. Telco as the network provider will deliver the SMS message and charge the buyer for the transaction while the eBook Provider will store, list, market, promote and provide the eBook. For example:

- Buyer A sends an SMS message to eInfoC short-code number (for example 36525) with request to purchase eBook A that is worth USD 4.95.
- The eInfoC will reply with a receipt to the corresponding buyer via Telco.
- Telco will forward the receipt to the buyer and charge the buyer with USD 4.95.
- Telco will share the revenue (USD 4.95) with eInfoC on the agreed ratio, for example 30 % to Telco and 70 % to eInfoC. Thus, Telco will receive USD 1.485 and eInfoC will receive USD 3.465 for the transaction.

2.2 Receipt System

Receipt is an SMS message sent out to the buyers from the eBook Provider that contains acknowledgement of successful transaction, password for the eBook purchased, and instructions on how to download (collect) the eBook. Buyers can use the receipt to collect the purchased eBook by visiting the eBook Provider web site and entering the supplied password.

2.3 Process Flow

Figure 1 shows all the entities in the system, which consists of:

- Buyers - Buyers with mobile phones that support WAP and SMS function.
- Merchant - Merchant has the infrastructure to enable the P-SMS system and also has deal with several Telcos, thus eliminating the need for eBook Provider to negotiate with each individual Telco. Therefore, Merchant can act as the intermediary between eBook Provider and Telco.
- Telco - Telco as the wireless network provider will deliver the SMS message and charge the buyer according to the eBook price. The revenue from the transaction will be shared between Telco and eBook Provider.

(d) Message Centre (MC) - All SMS messages that are transmitted to or from a mobile phone will be transmitted first to the MC. MC will process the message, store it and determine the destination address of the receiver.

(e) eBook Provider (eP) - eP provides the eBook for sale. eP also pays fee to merchant to handle the mPayment system.

(f) WAP site - WAP site is the online eBook store that can be accessed from a mobile phone. Buyers can view lists of eBook product for sale and instruction on how to purchase the product.

(g) Web site - Buyers who purchased the eBook through P-SMS can download their eBooks from this web site by entering their mobile phone numbers and eBook passwords.

Using the ERD diagram in figure 1 as the framework, the process flow can be further classified into three phases, which are:

- Phase 1: Browsing eBook Provider WAP site and making purchase.
- Phase 2: Payment scheme using P-SMS.
- Phase 3: Collecting purchased eBook using the receipt system.

All these three phases made up a system, which is called mPSMS.

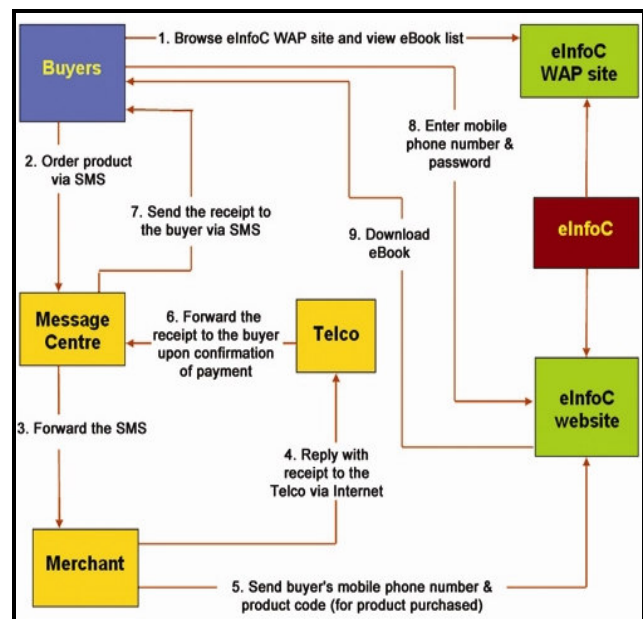


Figure 1: Entities in mPSMS system

Before proceeding to the next sections, readers should be familiarized with these terminologies:

- ♣ MO – Mobile Originated, an SMS message sent from a mobile phone, contains a product's keyword for an item to be purchased.
- ♣ MT (Receipt) – Mobile Terminated, an SMS message sent to a mobile phone, contains a message acknowledging the successfulness of transaction, password, and instruction to download the eBook.
- ♣ MC – Message Center, when a user sends out an SMS message, the message will be transmitted first to the MC. MC will process the message, store it and determine the destination address of the receiver.
- ♣ eBook Code – a code used to identify an eBook, for example EB001.
- ♣ Short-code number – a special 5 digits number used for P-SMS scheme, for example 36652.

2.4 Phase 1: Browsing eP WAP site and making purchase

In this phase, buyers browse the eP WAP site via his mobile phone, view description about eBook and make a purchase by sending an SMS message to the provided Short-code number.

The processes of browsing eP WAP site and making purchase as depicted in **Appendix A** contain of the following steps:

- i. A buyer browses the eP WAP site via micro browser embedded in the buyer's mobile phone.
- ii. The buyer views a list of eBook items for sale and selects the item to view its descriptions.
- iii. A brief description about the items will be displayed along with the eBook Code and the Short-code number.
- iv. To buy an item, the buyer sends an SMS message (MO message) from his mobile phone. The SMS contains the eBook Code sent to the Short-code number.

2.5 Phase 2: Payment scheme using P-SMS

In this phase, the payment process will be performed. Merchant will send the transaction detail to the Telco and eP, also the Receipt message (MT) to Telco, then Telco will charge the buyer and forward the Receipt to the buyer.

The payment scheme as depicted in **Appendix B** consists of the following steps:

- i. The SMS message from the buyer will be transmitted to the MC.
- ii. The short-code will be used by the MC to identify the corresponding recipient (Merchant).
- iii. MC will forward the SMS message to the corresponding Merchant.
- iv. Merchant upon receiving the SMS message; will process the request and respond back with the Receipt message.
- v. Merchant sends the Receipt message to the buyer through the Telco.

- vi. The transaction is recorded by the Merchant once the Receipt message is sent out to the buyer.
- vii. Merchant sends the transaction detail (buyer's phone number and eBook Code) to the eP.
- viii. eP will record the buyer's phone number and eBook Code to the corresponding entry in the database.
- ix. Telco upon receiving the Receipt message will validate the buyer's account to determine the account status. For the prepaid user; Telco will check if the user has sufficient balance (if valid proceed to step xi, else proceed to step x).
- x. The Receipt message will be discarded and the transaction ends.
- xi. The Receipt message will be transmitted to the corresponding buyer and the charge is deducted from the buyer's prepaid amount. For the postpaid user, the charge is incurred in his monthly bill; the transaction will be recorded by the Telco.
- xii. The buyer will receive the Receipt message from the Telco via SMS

2.6 Phase 3: Collecting purchased eBook using receipt system

In this phase, when a buyer has received the Receipt from Telco via SMS, he can then log on to eP web site, enter the supplied password and download the eBook.

The collecting purchased eBook phase as depicted in **Appendix C** consists of the following steps:

- i. The buyer visits the eP web site.
- ii. He logins (A new user must register with the web site first).
- iii. The buyer enters his mobile phone number to view purchased items.
- iv. List of eBook purchased by the buyer will be displayed (the system will match the buyer's mobile phone number with the stored mobile phone number in the database).
- v. The buyer selects an eBook and keys in the password.
- vi. System will verify the password (if the password is valid proceed to step viii, else proceed to step vii).
- vii. An error message will be displayed.
- viii. The eBook will be downloaded to the buyer's computer.
- ix. The system will enter the eBook Code and buyer's phone number to the *Delivered table* in the database, served as a remark that the eBook has been delivered to the corresponding buyer.
- x. The system will delete the eBook Code and buyer's phone number from the *ProductOrdered table*.
- xi. Repeat step v if the user has more than one eBook to be downloaded.
- xii. Transaction ends when user has no more eBook to download.

3. DEMONSTRATING PROCESS FLOW THROUGH PROTOTYPING

In this phase, prototyping was required in order to demonstrate the process flow of buying eBook using mPayment:

- WAP prototype for the first phase of the process flow (i.e. browsing of eP WAP site and make purchase)
- P-SMS prototype for the second phase of the process flow
- Web prototype for the third phase of the process flow (i.e downloading of eBook)

The eInfoC web site was used as the design basis since the flow is based on the eInfoC web site. Four design factors identified as the design guidelines for mobile application were followed (a) simple interface, (b) concise and short text, (c) keep data entry to a minimum, if possible use option list, and (d) use images sparingly. These resulted in four main screens used for browsing and purchasing at the WAP site:

Screen 1: The welcoming page for eInfoC WAP site. A brief description about the site will be displayed; a user needs to press the soft key labeled “List” to proceed to next page.

Screen 2: The list of eBooks for sale will be retrieved from the database and displayed onto the mobile phone screen.

Screen 3: A buyer highlights eBook using the arrow key and presses the soft key labeled “Select” to view its description. The system retrieved the data from the database. A brief description about the items will be displayed along with the price and authors. See Figure 2.

Screen 4: User selects the “Buy” link to view buying instruction. An instruction on how to purchase, along with the product code, short-code number and product’s price will be displayed. See Figure 3.

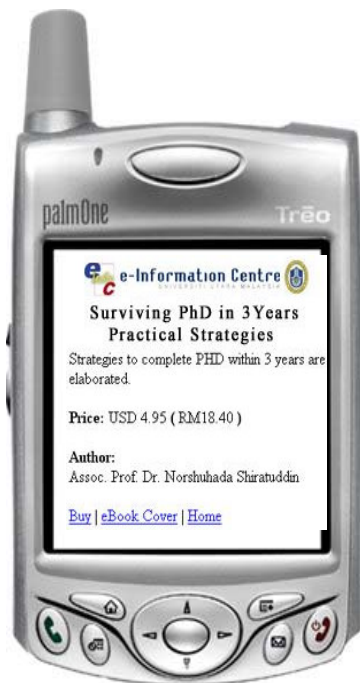


Figure 2 : eBook descriptions

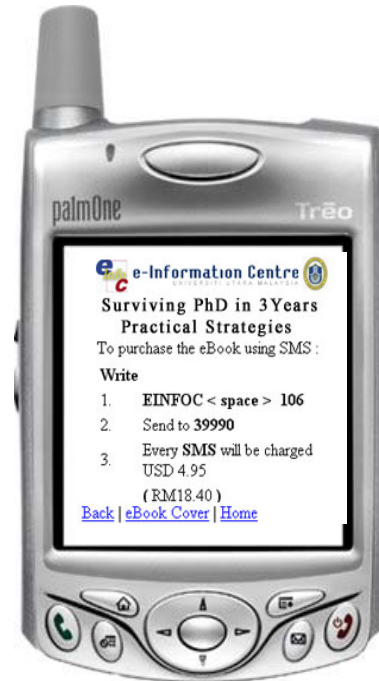


Figure 3: Purchase instructions

Then, a downloading facility was developed for the eInfoC web site. The objective of the download facility is to demonstrate the third phase of the process flow for collecting purchased eBooks using the Receipt system. The facility is a web-based application and requires a Microsoft Windows based web server to host the application and a web browser. This facility was developed using the ASP technology. Five main screens are involved in downloading the purchased item.

Screen 1: The buyer visits the eInfoC website at <http://www.e-infoc.uum.edu.my/> and clicks the menu to download the eBook or enter directly the URL at <http://www.e-infoc.uum.edu.my/downloadWAP/login.asp>.

Screen 2: The buyer enters his/her mobile phone number to view purchased items. See Figure 4.

Screen 3: A list of eBooks purchased by the buyer will be displayed (the system will match the buyer’s mobile phone number with the stored mobile phone number in the database).

Screen 4: The buyer selects an eBook to download and keys in the password (as provided by the SMS. The password acts as a receipt). See Figure 5. The system will verify the password, if the password is valid it proceeds to the next step or else an error message will be displayed.

Screen 5: A successful transaction will allow a user to download the purchased eBook and it will be downloaded to the buyer’s computer.



Figure 4: Phone number authentication page



Figure 5: Entering password and downloading eBook

A survey was conducted in February 2006 to determine the degree of user acceptance of mPayment using mPSMS. A set of electronic questionnaire was developed asking participants, to provide their views on the items questioned. The items in the questionnaire were divided into six user acceptance categories or factors: Wireless Trust Environment, Perceived Usefulness, Perceived Ease of Use, Facilitating Conditions, Systems Complexity, and Social Influences.

A total of 46 mobile phone users participated in this study. These participants were allowed to test the mPSMS by browsing and buying eBooks from eInfoC. After the testing, the participants were required to fill up the electronic questionnaire.

A five-point Likert scale was used in the questionnaire, which are: 1- Completely disagree, 2- Disagree, 3- Unsure, 4- Agree and 5- Strongly agree. Based on the total number of items in each category, the mean analysis was tabulated accordingly as presented in Table 1.

Table 1: User Acceptance Mean Analysis

Factors	Number of Items	Mean	Overall Mean
Wireless trust environment (i.e security issues)	3	3.9783 3.9130 4.1957	4.03
Perceived usefulness	4	4.0652 3.9348 3.8193 4.1304	3.99
Perceived ease of use	4	4.0870 4.1087 3.6304 3.3043	3.78
Facilitating conditions (e.g. buying instructions, accessibility speed, access cost, and assistance)	5	3.9348 3.7333 4.1087 3.7391 4.1304	3.93
System complexity (e.g. design, facility, etc.)	4	4.1739 3.7174 3.8000 3.3478	3.76
Social influences (e.g. proud, confidence and status)	3	4.2174 4.0652 4.1304	4.14

Overall findings indicate that mobile phone users are prepared to accept payment method via SMS such as proposed by this study (i.e. mPSMS). The idea of being able to view products via WAP sites is also well accepted. Nonetheless, this study has identified two key factors that affect user acceptance of mPSMS, first, the social influence and second, wireless trust. Also, most respondents feel proud of themselves when they are able to use their mobiles to perform business transactions. Furthermore, they also feel secured when buying via SMS. Having said this, any system such as mPSMS and WAP eInfoC should be designed by taking into considerations other equally important factors including perceive usefulness and perceive ease of use.

4. CONCLUSION

In this project, P-SMS that employs profit sharing approach and electronic receipt system are proposed for the payment scheme in

buying eBook. We called the system mPSMS. The use of SMS as the payment medium caters the demand of potential buyers especially in higher learning environments. eInfoC that was used as the case study in this project, can now offer the mPayment as one of the payment methods.

Essentially, the proposed process flow catered all the processes involved in implementing the mPayment for buying eBook. Our mPayment model that is based on WAP, P-SMS and receipt system should provide a new payment channel that will open new possibilities of marketing eBook, not limited to Malaysian market but also world wide.

5. ACKNOWLEDGMENTS

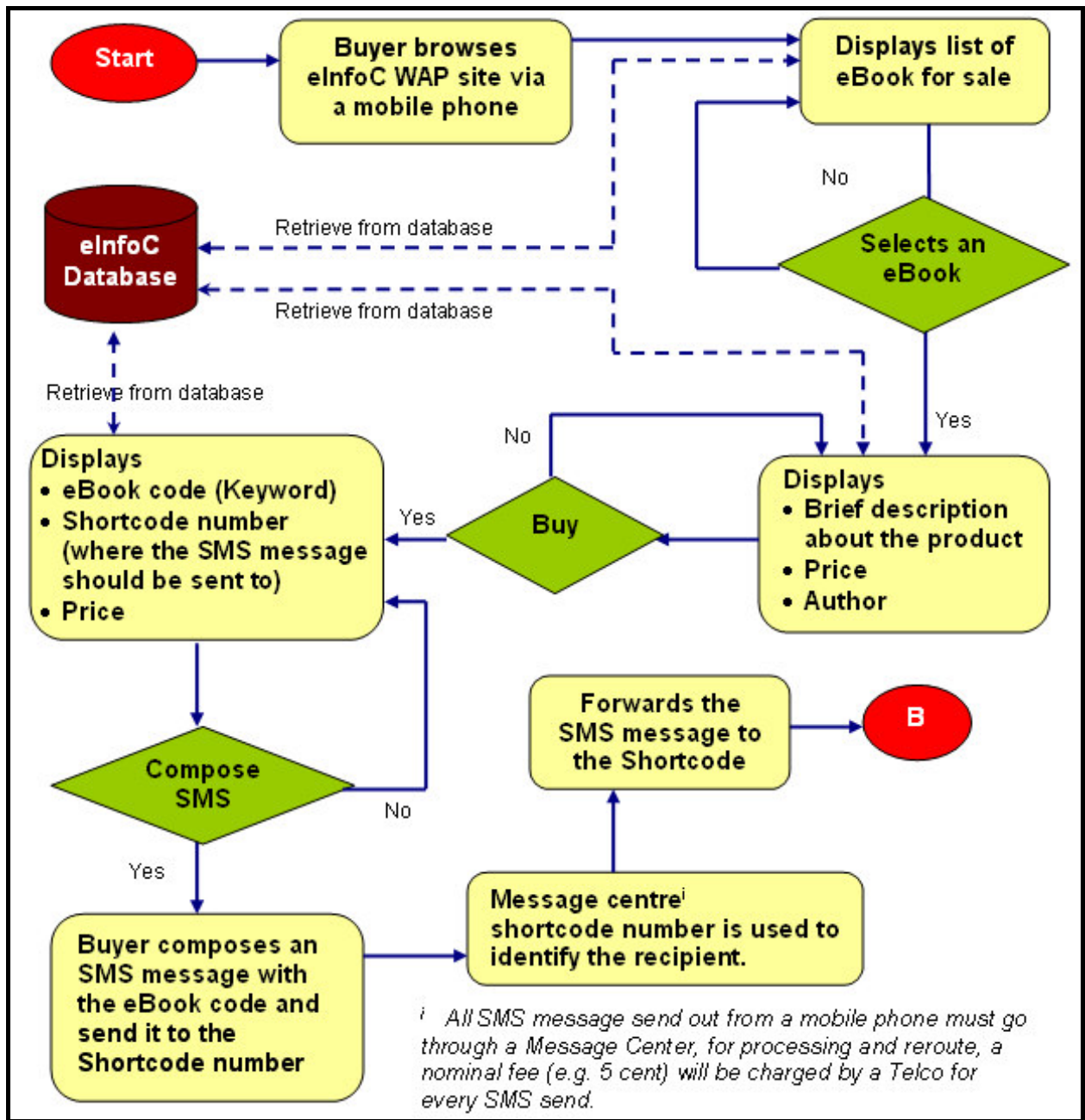
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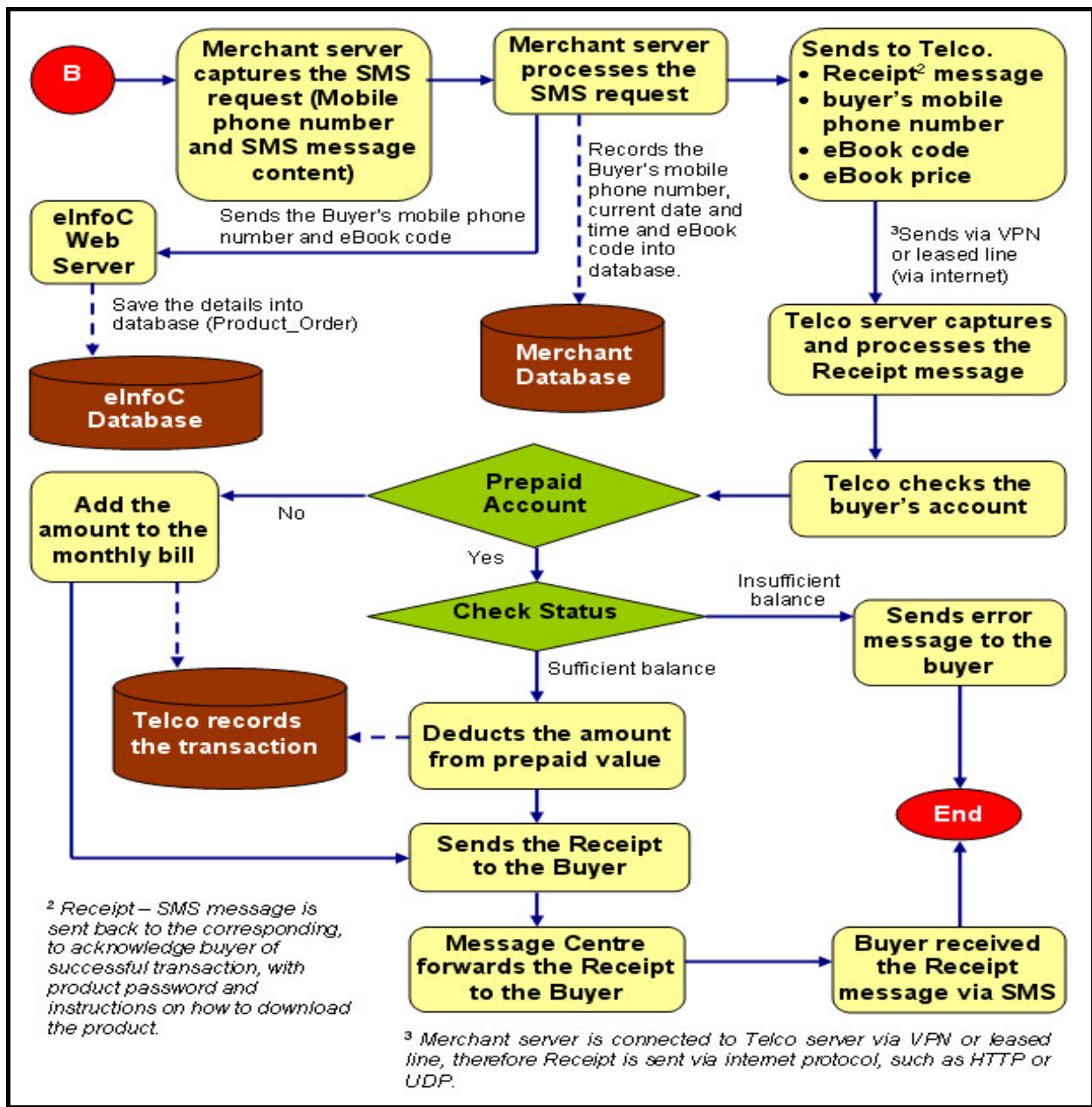
Appendix A

Phase 1 - Browsing eInfoC WAP site and making purchase



Appendix B

Phase 2 - Payment scheme transaction using PSMS



Appendix C

Phase 3 - Collecting Purchased eBook using Receipt System

